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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/066,131	01/30/2002	John M. White	AMAT/6148/DISPLAY/AKT/BG	3348

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EXAMINER

TRAN, CHUC

ART UNIT PAPER NUMBER

2821

DATE MAILED: 03/13/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

10/066,131

Applicant(s)

WHITE ET AL.

Examiner

Chuc D Tran

Art Unit

2821

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 30 January 2002.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-70 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-16,26,36 and 45 is/are rejected.
- 7) ☒ Claim(s) 17-25,27-35,37-44 and 46-70 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

### Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

### Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 2.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

## **DETAILED ACTION**

### ***Claim Rejections - 35 USC § 112***

1. Claims 1, 6, 13 and 26 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Re claims 1 and 6, the recitation “disposed about the chamber” is indefinite because it is not clear what is being implied by “disposed about the chamber”.

Re claim 13, the recitation “the top at about a midsection” is indefinite because it is not clear what is being implied “the top at about a midsection”.

Re claim 26, the recitation “disposed about orthogonal” is indefinite because it is not clear what is being implied by “disposed about orthogonal”.

### ***Claim Rejections - 35 USC § 102***

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) and the Intellectual Property and High Technology Technical Amendments Act of 2002 do not apply when the reference is a U.S. patent resulting directly or indirectly from an international application filed before November 29, 2000. Therefore, the prior art date of the

Art Unit: 2821

reference is determined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

3. Claims 1-16, 26, 36 and 45 are rejected under 35 U.S.C. 102(e) as being anticipated by Hanawa et al (USP. 6,468,388).

Regarding claim 1, Hanawa et al disclose a reactor chamber comprising;

- a chamber (100), a bottom, a top (110), and a body disposed between the bottom and the top (Fig. 14);

- a first plasma source (175) disposed about the chamber (100) and defining a first plasma current path (150a) (Col. 12, Line 36) therein; and

- at least one plasma shaping apparatus disposed adjacent the first plasma current path (Col. 18, Line 26).

Regarding claim 2, Hanawa et al disclose the first plasma source (180a) comprises a hollow member (150) and wherein the at least one plasma shaping apparatus is disposed at one end of the hollow member (Col. 12, Line 40) (Fig. 15).

Regarding claim 3, Hanawa et al disclose the first plasma source (180a) comprises a pair of outlets wherein each outlet is registered with respective openings formed in opposing sides of the body (Col. 13, Line 1).

Regarding claim 4, Hanawa et al further disclose the reactor chamber (100) comprising a substrate support member having a substrate receiving surface and wherein the respective openings in the opposing sides of the body are at least as wide as the substrate receiving surface (Col. 5, Line 27) (Fig. 14).

Regarding claim 5, Hanawa et al further disclose the reactor chamber (100) comprising a showerhead (210) connected to the top and in facing relationship with the substrate receiving surface and wherein the respective openings in the opposing sides of the body are disposed between the showerhead and the substrate receiving surface (Col. 8, Line 43).

Regarding claim 6, Hanawa et al further disclose the reactor chamber (100) comprising a second plasma source (180a) disposed about the chamber and overlapping at least a portion of the first plasma source (180b), wherein the second plasma source defines a second plasma path (170-2)(Col. 12, Line 60) (Fig. 17A).

Regarding claim 7, Hanawa et al further disclose the reactor chamber (100) comprising the first and second plasma sources each define an outlet at each of their respective ends and wherein the outlets of the first plasma source are registered with respective openings formed in a first pair of opposing sides of the body and the outlets of the second plasma source are registered with respective openings formed in a second pair of opposing sides of the body (Col. 12, Line 60) (Fig. 17A).

Regarding claim 8, Hanawa et al further disclose the reactor chamber (100) comprising the first and second plasma sources each comprise: a hollow member (150), wherein each hollow member defines at least a portion of the respective first and second plasma paths (Col. 12, Line 27) (Col. 12, Line 56).

Regarding claim 9, Hanawa et al further disclose the reactor chamber (100) comprising a coil disposed proximate each of the hollow members and adapted to produce a magnetic field therein (Col. 12, Line 56) (Col. 13, Line 1) (Fig. 17A).

Regarding claim 10, Hanawa et al further disclose the reactor chamber (100) comprising at least one other plasma shaping apparatus disposed adjacent the second plasma current path (Col. 12, Line 40).

Regarding claim 11, Hanawa et al further disclose the reactor chamber (100) comprising each of the plasma shaping apparatuses are disposed at an outlet of the respective hollow member (Col. 12, Line 35).

Regarding claim 12, Hanawa et al further disclose the reactor chamber (100) comprising the first plasma source (150) comprises: a hollow member defining at least a portion of the first plasma current path therein; a plenum coupled to each end of the member, wherein each plenum (2910) is registered with a respective opening formed in the body (Col. 4, Line 44) (Col. 15, Line 46).

Regarding claim 13, Hanawa et al further disclose the reactor chamber (100) comprising the hollow member (150a) linearly traverses the top at about a midsection thereof (Fig. 16).

Regarding claim 14, Hanawa et al further disclose the reactor chamber (100) comprising the hollow member comprises at least a short transverse section of insulating member adapted to prevent the formation of a closed electrical path on the hollow member in about a longitudinal direction (Col. 14, Line 64) (Fig. 27).

Regarding claim 15, Hanawa et al further disclose the reactor chamber (100) comprising a first antenna (170) disposed over the top and adapted to inductively couple energy into the first plasma current path defined within at least a portion of the hollow member (Col. 12, Line 27) (Fig. 14).

Art Unit: 2821

Regarding claim 16, Hanawa et al disclose the reactor chamber (100) comprising the antenna is a coil (170) wound about at least one axis generally orthogonal to the first plasma current path (150a) (Fig. 16) (Col. 12, Line 56).

Regarding claim 26, Hanawa et al disclose the reactor chamber (100) comprising:

a first hollow member (1520a) defining a first plasma current path (Col. 6, Line 43);

a second hollow member (1520b) defining a second plasma current path and disposed about orthogonal with respect to the first hollow member (Col. 6, Line 43);

a first RF source (180a) disposed along a least a portion of the first hollow member and adapted to produce a first magnetic field within the first hollow member (Col. 12, Line 42);

a second RF source (180b) disposed along a least a portion of the second hollow member and adapted to produce a second magnetic field within the second hollow member (Col. 12, Line 42);

a first plasma shaping apparatus (1015-1) disposed at one end of the first hollow member (150-1) (Col. 12, Line 56) (Fig. 17A);

a second plasma shaping apparatus (1015-2) disposed at one end of the second hollow member (150-2) (Col. 12, Line 56) (Fig. 17A).

Regarding claim 36, Hanawa et al disclose the reactor chamber (100) comprising a body including an inner surface defining an opening to allow plasma (150a) therethrough, wherein the opening has a cross section of varying dimensions to affect plasma current flowing through the opening (Col. 12, Line 27) (Fig. 14).

Regarding claim 45, Hanawa et al disclose a method of substrate processing the reactor chamber (100) comprising:

Art Unit: 2821

- flowing a first gas into a first plasma current path defined by a first hollow member located external to a processing region (Col. 6, Line 55) (Col. 12, Line 27);
- applying power to a first antenna (170) adjacent the first hollow member to inductively couple energy into the first gas to form a first plasma current generating a first plasma from the first gas (Col. 11, Line 2);
- flowing the first plasma generating current across the processing region and through another end of the first hollow member to define a first closed plasma current path (Col. 10, Line 45); and
- flowing a process gas through a showerhead (210) into the processing region and forming a plasma of the process gas adjacent a substrate using the first plasma of the first gas (Col. 10, Line 54).

***Allowable Subject Matter***

4. Claims 17-25, 27-35, 37-44 and 46-70 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

5. The following is a statement of reasons for the indication of allowable subject matter:

The prior art of record fails to appreciate the advantage offered by plasma shape opening registered with an outlet of the first plasma source with the following distinctive features such as set by all of the independent claims. In particular, the art of record fails to teach or fairly suggest constructing plasma shape opening registered with an outlet of the first plasma source, wherein the cross-sectional area of the first portion is different than the cross sectional area of the second



Art Unit: 2821

portion as posses all of the distinctive features such as defined by independent claims 1 to improve process uniformity.

***Citation of relevant prior art***

Prior art Hanawa et al (USP. 6,468,388) disclose a reactor chamber for an externally excited torroidal plasma source.

Prior art Mahoney et al (USP. 6,432,260) disclose an inductively coupled ring-plasma source apparatus.

Prior art Godyak (US 2003/0015965) disclose an inductively coupled plasma reactor.

Prior art Hanawa et al (USP. 6,453,842) disclose an externally excited torroidal plasma source.

***Inquiry***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Chuc D Tran whose telephone number is (703)306-5984. The examiner can normally be reached on M-F Flex hours.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Don Wong can be reached on (703)308-4856. The fax phone numbers for the organization where this application or proceeding is assigned are (703)308-7722 for regular communications and (703)308-7724 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703)308-0956.

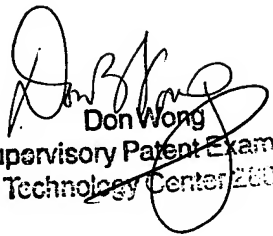
Application/Control Number: 10/066,131

Page 9

Art Unit: 2821

TDC

March 3, 2003

  
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